

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**LISTING OF CLAIMS:**

Claims 1-18 (canceled)

19. (Currently Amended) A state engine receiving multiple requests from a parallel processor for a shared state, the state engine comprising:

at least one state element means, said at least one state element means adapted to operate, atomically, on said shared state in response to a request made by said parallel processor, wherein

said request includes at least a command directing said at least one state element means on how to perform an operation on said shared state, said operation including reading, modifying, and writing back said shared state; and

a memory connected to said at least one state element means and configured to store said shared state.

20. (Previously Presented) A state engine as claimed in claim 19, wherein the operation performed by said at least one state element means is a single read-modify-write operation.

21. (Previously Presented) A state engine as claimed in claim 19, wherein said shared state comprises a single item of state.

22. (Previously Presented) A state engine as claimed in claim 19, wherein said shared state comprises multiple items of state.

23. (Previously Presented) A state engine as claimed in claim 19, wherein said state comprises a single storage location or a data structure in storage.

24. (Previously Presented) A state engine as claimed in claim 19, wherein the operation performed by said at least one state element means is carried out as a fixed or hardwired operation.

25. (Previously Presented) A state engine as claimed in claim 24, further comprising means to supply data to update said shared state.

26. (Previously Presented) A state engine as claimed in claim 24, further comprising means for sending a command and data to said shared state, whereby said operation is programmable.

27. (Previously Presented) A state engine as claimed in claim 19, further comprising a plurality of said state element means organized into state cell means, whereby operations performed on said shared state are pipelined.

28. (Previously Presented) A state engine as claimed in claim 27, further comprising a plurality of said state cell means, whereby to allow multiple requests to be handled concurrently.

29. (Previously Presented) A state engine as claimed in claim 28, further comprising input and output interconnect means providing access to and from said state cell means, a bus interface for said input and output interconnect means, said bus interface interfacing with a system bus and a control unit of a processing element for controlling accesses to said shared state.

30. (Previously Presented) A state engine as claimed in claim 27, wherein each said state element means comprises local memory, and each field of a data record is stored in a respective memory of a respective state element means.

31. (Previously Presented) A state engine as claimed in claim 19, wherein each said state element means comprises a local memory for said shared state, an

arithmetic unit adapted to perform the operation on said state in said local memory, and command and control logic to control said operation.

32. (Currently Amended) A parallel processor including a state engine, said state engine receiving multiple requests from said parallel processor for a shared state, the state engine comprising:

at least one state element means, said at least one state element means adapted to operate, atomically, on said shared state in response to a request made by said parallel processor, wherein

said request includes at least a command directing said at least one state element means on how to perform an operation on said shared state, said operation including reading, modifying, and writing back said shared state; and

a memory connected to said at least one state element means and configured to store said shared state.

33. (Previously Presented) A parallel processor as claimed in claim 32, wherein said parallel processor is an array processor.

34. (Previously Presented) A parallel processor as claimed in claim 33, wherein said array processor is a SIMD processor.

35. (Currently Amended) A computer system comprising a parallel processor, said parallel processor including a state engine, said state engine receiving multiple requests from said parallel processor for a shared state, the state engine comprising:

at least one state element means, said at least one state element means adapted to operate, atomically, on said shared state in response to a request made by said parallel processor, wherein

said request includes at least a command directing said at least one state element means on how to perform an operation on said shared state, said operation including reading, modifying, and writing back said shared state; and

a memory connected to said at least one state element means and configured to store said shared state.

36. (Currently Amended) A network processor comprising a parallel processor, said parallel processor including a state engine, said state engine receiving multiple requests from said parallel processor for a shared state, the state engine comprising:

at least one state element means, said at least one state element means adapted to operate, atomically, on said shared state in response to a request made by said parallel processor, wherein

said request includes at least a command directing said at least one state element means on how to perform an operation on said shared state, said operation including reading, modifying, and writing back said shared state; and

a memory connected to said at least one state element means and configured to store said shared state.

37. (Previously Presented) A parallel processor as claimed in claim 32, implemented on a single silicon chip.

38. (Currently Amended) A state engine receiving multiple requests from a parallel processor for a shared state, the state engine comprising:

means for operating, atomically, on said shared state in response to a request made by said parallel processor, wherein

said request includes at least a command directing said means for operating on how to perform an operation on said shared state, said operation including reading, modifying, and writing back said shared state;

a memory connected to said means for operating and configured to store said shared state; and

means to supply data to update said shared state.

39. (Previously Presented) A state engine as claimed in claim 19, wherein said operation results in a change of said shared state.

40. (Previously Presented) A state engine as claimed in claim 19, wherein said state engine is a programmable entity capable of executing shared memory instructions.

41. (Previously Presented) A state engine as claimed in claim 19, wherein said memory is within said state element.

42. (Previously Presented) A state engine as claimed in claim 19, wherein said state engine includes a plurality of state elements which comprise a plurality of local shared memories which provides a composite bandwidth that is a sum of all bandwidths associated with each one of said plurality of local shared memories.

43. (Previously Presented) A state engine as claimed in claim 42, wherein state transactions are processed with said state engine and accesses to shared memory are passed on a system bus.

44. (Previously Presented) A state engine as claimed in claim 42, wherein each of said plurality of state elements includes a single serialization access point resulting in a plurality of serialization access points within said state engine.

45. (Previously Presented) A state engine as claimed in claim 42, wherein said plurality of state elements perform as a plurality of partitioned processing functions.

46. (Currently Amended) A ~~state engine~~parallel processor as claimed in claim 32, further comprising:

a plurality of state engines, wherein one or more of said state engines are applied to a system bus and wherein said one or more of said state engines operate separately from each other.